Masami MIZUTANI* & Sinske HATTORI*: On some little known species of *Lophocolea* (Hepaticae) from the Southern Hemisphere

水谷正美*・服部新佐*: 南半球産 *Lophocolea* の疑問種二，三について

A number of species of *Lophocolea* (Hepaticae) have been described from the tropical and southern regions of the world by several authors, notably by Stephani in his Species Hepaticarum in which we may find many heterogeneous groups. It is true, at least, in those recorded from the southern to antarctic regions. We pointed out already in the preceding paper[1] that some species of *Lophocolea* described from the Southern Hemisphere are similar to *Pachyglossa*, and it is possible that they may be united to the latter genus. By courtesy of Dr. C. E. B. Bonner, Genève, we were able to examine the schizotype specimens on loan of such species as *Lophocolea azopardana*. The result of our studies was expressed in the following pages. We wish to thank here cordially to Dr. Bonner for his kind help.

Pachyglossa azopardana (Steph.) Mizutani et Hattori comb. nov.—Basionym: *Lophocolea azopardana* Steph. Spec. Hepat. **3**: 54 (1906). Fig. I, 1-21.

Plants rigid, brown in mats. Stem erect, to 2 cm long, 0.2 mm in diameter, 0.8-1 mm wide with leaves, rigid, sparsely branched, branches arising from underleaf-axils; cross-section of stem about 10 cells in diameter, cortex 2-3 cells thick, cortical cells much smaller than inner cells, walls thickened very much, brown, trigones indistinct. Rhizoids not seen. Leaves alternate, transversely, inserted, loosely imbricate, nearly in rows together with underleaves, nearly erect, more or less incurved, obliquely oval, about 0.75 mm long, 0.5 mm wide, apex rounded or obtuse, narrowed (and somewhat falcate) toward base, margins often narrowly reflexed, entire or slightly crenulate with projecting cells; cross-section of leaf base linear, mostly 2 cells thick, ditto of middle partly so, and ditto of upper part 1-celled; cells 10-15μ along margin, about 15μ at middle, trigones indistinct, walls thickened, basal cells to $40 \times 20\mu$, cuticle smooth. Underleaves similar to leaves, but smaller and nearly symmetrical, nearly erect, transversely inserted, ligulate-oblong, almost flat, about 0.5 mm long, 0.3 mm wide, obtuse or slightly emarginate. Female in-

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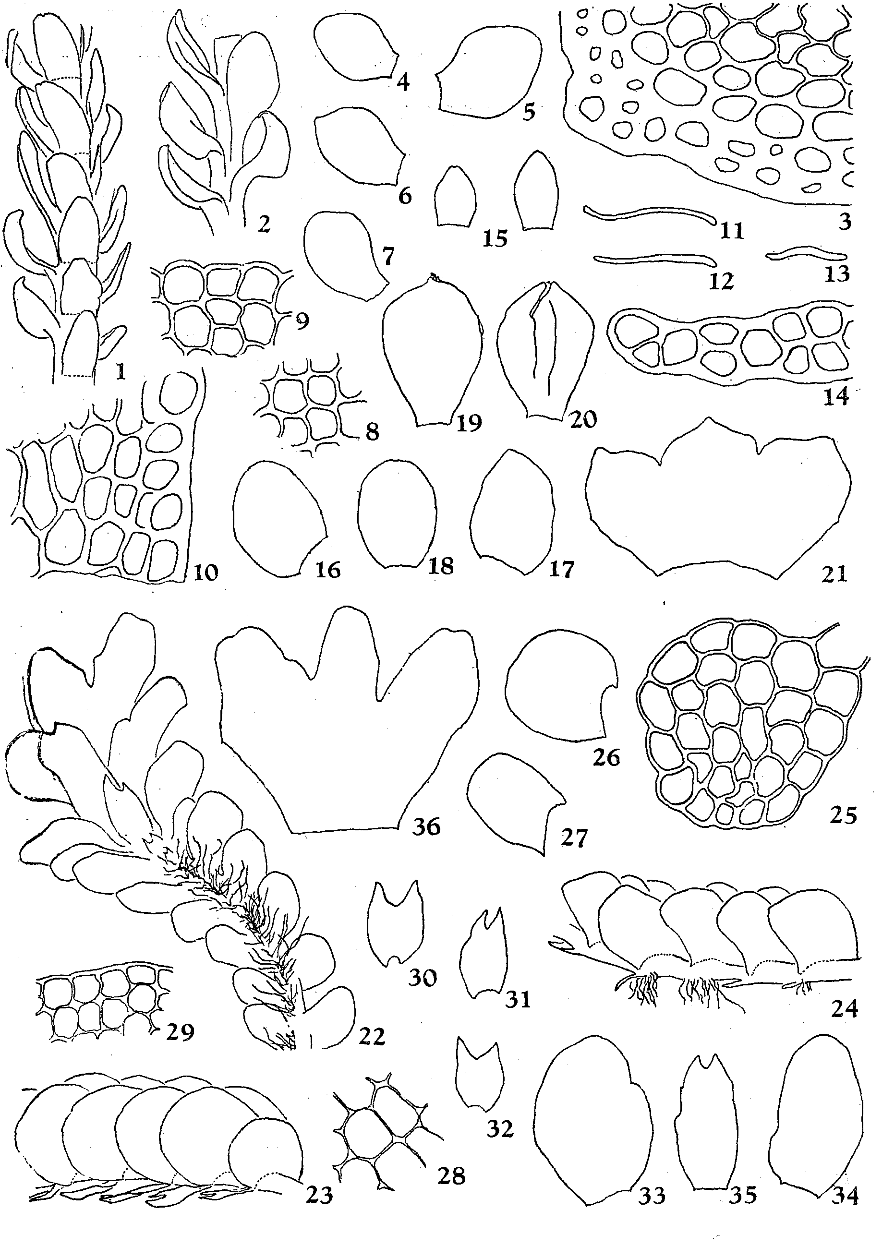
[1] *Pachyglossa tristicha* Herz. and its relationships. Journ. Jap. Bot. **33**: 359-363. fig. 1-2. 1958.



florescence terminal, usually with single innovation; bracts larger than leaves, oval, 0.75 mm long, 0.6 mm wide, apex nearly rounded, more or less hyaline, bracteole quite similar to bracts, 0.7 mm long, 0.55 mm wide, apex rounded or slightly emarginate. Perianth almost pyriform *in situ*, 1 mm long, 0.7 mm wide, strongly triplicate, plicae rounded (not sharp), 2 lateral and 1 dorsal, apex 3-lipped 1/4 to 1/3, lips subtriangular, usually apiculate, margin mostly hyaline; archegonia about 10 per perianth, flask-shaped. Male inflorescence not seen. (The description was made from the type specimen except the female inflorescence which was based on *Dusen 233*).

Specim. exam. Tierra del Fuego: Azopardo en rivulis frigidis, 600 m, *Dusen 121*-type. Insula Desolacion: Puerto Angosto, ca. 600 m, *Dusen 233*, April 1, 1896; ad rivul. ca. 250 m, *Dusen 178*, March 29, 1896. Südgeorgien, *Skottsberg 9*. All specimens in Herb. G.

The type syecimen agrees well Stephani's original description and the figures in his unpublished Icones Hepaticarum. It seems to be hygro- or hydrophilous, because of numerous diatomes are attached to the plant body. Dusen's collection no. 233 has leaves which are more rounded and more or less thinner than the type, and are not crenulate. Dusen no. 178 is more rigid but smaller, and its leaves are much denser, nearly symmetrical and almost hyaline along the margin whose cells are much thickened. In Skottsberg's collection no. 9 only a single stem was found in a mat of *Andreaea*. It appears to be similar to Dusen no. 233, but we were unable to study to our satisfaction. We regarded, however, all the above-mentioned differences are due to habitat modifications in one and same species.

We propose here a new combination for the present species, based on the following characters:

(1) Leaves and underleaves are quite similar in shape, both transversely inserted

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Fig. I. 1-21. ***Pachyglossa azopardana*** (Steph.) Mizut. et Hatt.

1. Part of branch, ventral view, ×18. 2. Do., dorsal v., ×18. 3. Cross-section of stem, ×360. 4-7. Leaves, ×18. 8. Middle cells of leaf, ×360. 9. Apex of leaf, ×360. 10. Base of leaf, ×360. 11-13. Cross-sections of leaf (11, middle part; 12, lower part; 13, basal part), ×30. 14. Part of 13, ×360. 15. Underleaves, ×18. 16, 17. Female bracts, ×18. 18. Female bracteole, ×18. 19. Perianth, ventral view, ×18. 20. Do., dorsal v., ×18. 21. Do., dissected out, ×18.

22-26. ***Lophocolea flavo-virens*** Steph.

22. Plant with perianth, ventral view, ×18. 23, 24. Parts of branch, lateral v., ×18. 25. Cross-section of stem, ×230. 26, 27. Leaves, ×18. 28. Middle cells of leaf, ×230. 29. Apex of leaf, ×230. 30-32. Underleaves, ×18. 33, 34. Female bracts, ×18. 35. Female bracteole, ×18. 36. Perianth dissected out, ×18.

Figures 1-15 were drawn from the type specimen, 16-21 from Dusen 178, 22-36 from the type specimen of *L. flavo-virens*; all drawn by M. Mizutani.

and erect to erect-patent; (2) the middle～basal portion of leaves is mostly 2-celled in thickness; (3) cortex is well differentiated, the cell walls much thickened and brown in colour; (4) branches arise from the underleaf-axil; (5) plants are erect, rigid and brown-coloured; (6) perianths are different in shape and not sharply keeled; and (7) rhizoids are not seen.

However, compared to *Pachyglossa tristicha*, the present species shows less isophylly; that is, the underleaves are much smaller than the leaves. The cross-section of leaves of *P. tristicha* is 2 cells thich throughout, whereas in the present species 1 cell thick, except from the middle to base of leaves. Stephani (1906) remarked, "Die Pflanze steht der *L. Boveana* sehr nahe und wurde auch s. Zt. so bekannt; die Zellgrösse weicht aber wesentlich ab.", and for the habitat he described, "Fuegia, Azopardo (Dusen), Insula Desolacion (Dusen)." *Lophocolea boveana* Mass. which was recorded from Fuegia was not available for our examination.

Lophocolea flavo-virens Steph. Spec. Hepat. **6**: 272 (1922). Fig. I, 22-36.

Plants small, flaccid, pale olive to brown. Stem creeping with ascending apex, to 2 cm long, 0.1 mm in diameter, about 1 mm wide with leaves, barely branched; cross-section of stem nearly rounded, 6-7 cells thick, cortical and inner cells hardly differentiated, walls somewhat thick, trigones absent. Rhizoids more or less brownish, rather numerous on underleaf-bases. Leaves succubous, densely imbricate or rarely distant, slightly convex, erect-patent or often horizontal, insertion embracing nearly half of stem, decurrent dorsally, wide ligulate or nearly rounded, 0.6-0.9 mm long, 0.5-0.8 mm wide, margin entire, apex truncate or rotundate: apical cells about 15μ, middle cells $15\text{-}30 \times 15\text{-}20\mu$, walls more or less thickened, trigones indistinct, basal cells to $50 \times 35\mu$, cuticle smooth. Underleaves contiguate or distant, erect to erect-patent, oblong, to 0.55 mm long, 0.4 mm wide, but mostly far smaller, 2-lobed to about 1/3, lobes triangular, acute, margin entire, sinus acute or rounded. Female inflorescence terminal; bracts longer than leaves, oblong-elliptical, to 1.2 mm long, 0.85 mm wide, ventral margin often with sharp sinus, apex rounded; bracteole ligulate, 1 mm long, 0.45 mm wide, bilobed to 1/8, teeth triangular, acute, lateral margin often with 1-3 minute teeth. Perianth somewhat similar to a lily flower with 3 lobes, indistinctly 3-keeled, mouth deeply trilobed, lobes ligulate with truncate or retuse apex.

Specim. exam. Patagonia: Huafo, *Skottberg 581*-type in Herb. G.

The perianth of this species is very distinctive, and the leaves are round and mostly erect-patent. It seems to differ much from the typical northern members of *Lophocolea* and rather heterogeneous. It has been known so far only from the type collection.

Lophocolea austrigena (Tayl.) Tayl. in Gott., Lindenb. et Nees, Synop. Hepat. 702 (1847); Steph. Spec. Hepat. **3**: 57 (1906). Syn. *Jungermannia austrigena* Tayl. London Jour. Bot. **3**: 466 (1844).—*J. cavispina* Tayl. loc. cit. 463; Gott., Lindenb. et Nees, Synop. Hepat. 670 (1847); Steph. loc. cit., pro syn. Fig. II, 1-8.

Plants large, brownish green. Stems to 4 cm long, 0.4 mm in diameter, brown, nearly erect, rigid, 1 mm wide and 3 mm high with laterally appressed leaves,

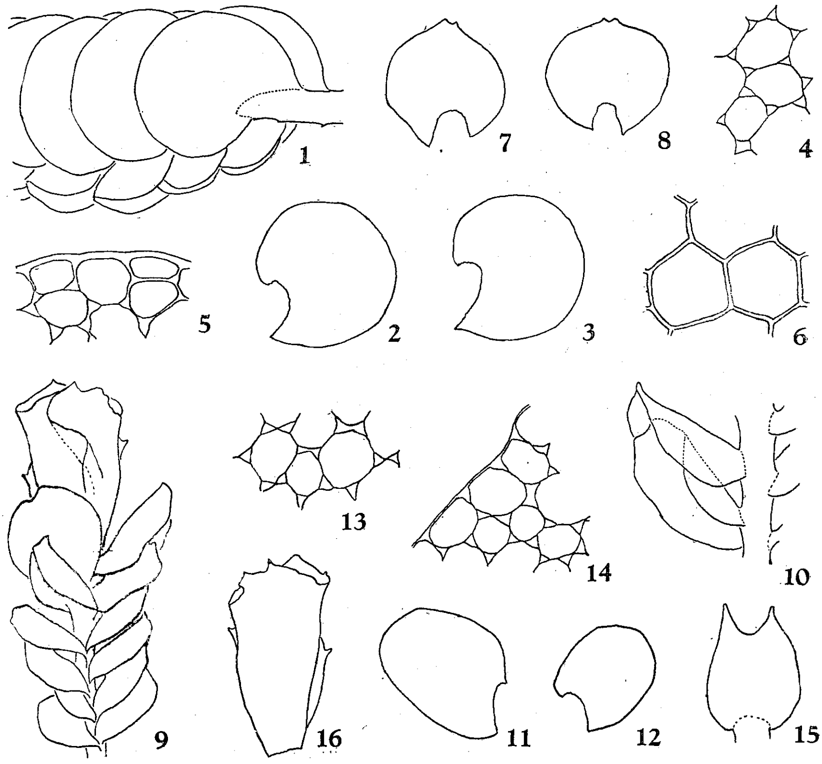

Fig. II. 1-8. *Lophocolea austrigena* (Tayl.) Tayl.
1. Part of stem, lateral view, ×10. 2, 3. Leaves, ×10. 4. Middle cells of leaf, ×230. 5. Apex of leaf, ×230. 6. Basal cells of leaf, ×230. 7, 8. Underleaves, ×10.
8-16. *Lophocolea novae-zelandiae* (L. et L.) Nees
9. Plant with perianth, dorsal view, ×10. 10. Part of branch, underleaves dissected away ventral v., ×18. 11, 12. Leaves, ×18. 13. Middle cells of leaf, ×360. 14. Apex of leaf, ×360. 15. Underleaf, ×30. 16. Perianth, ventral view, ×10.
All figures were drawn by M. Mizutani from the type specimens.

branches few, mostly arising from leaf-axils. Rhizoids not seen. Leaves succubous, densely imbricate, strongly erect-appressed, rather flat, nearly round, about 1.5 mm long, 2 mm wide, dorsally decurrent with sinuate, oblique insertion; cells 20–35×15–20μ along margin and at middle, walls thick, trigones rather large, acute, basal cells to 70×40μ, trigones indistinct; uticle smooth. Underleaves suberect, imbricate, strongly concave (nearly folded longitudinally), nearly round, about 1.2 mm long, 1.7 mm wide, apex usually bitoothed, teeth small, insertion to stem deeply sinuate.

Specim. exam. Hermite Island, *Hooker*, type in Herb. G.

Only a single sterile shoot was at our disposal. However, Stephani described, "Folia floralia caulinis simillima, multo majora; amphigastrium florale intim. caulinis haud diversum majus tamen et semper integerrimum; perianthia magna longe exserta oblonga triquetra ore truncato repando plicatulo integerrimo." This species resembles the preceding, but is distinguished by the shape of perianths and underleaves. As for the range of it, Stephani (1906) enumerated "Fretum magellanicum (Hooker, Hariot, Dusen); Falklands Islands (Hooker)."

Lophocolea novae-zelandiae (L. et L.) Nees in Gott., Lindenb. et Nees, Synop. Hepat. 168 (1844); Steph. Spec. Hepat. **3**: 112 (1906). Syn. *Jungermannia novae-zelandiae* L. et L. in Lehm. Pugillus Plant. **6**: 33 (1834).—*Jungermannia grisea* Tayl. London Jour. Bot. **3**: 379 (1844).—*Lophocolea grisea* Tayl. in Gott. Lindenb. et Nees, Synop. Hepat. 169 (1845).—*Jungermannia subintegra* Tayl. London Jour. Bot. **3**: 477 (1844).—*Lejeunea subintegra* Tayl. in Gott. Lindenb. et Ness, Synop. Hepat. 376 (1845). Fig. II, 9–16.

Plants greenish brown. Stems rigid, erect or ascending, to 12 mm long, 0.2 mm in diameter, 1.7 mm wide with leaves, scarcely branched; cross-section of stem elliptical, about 7 cells thick, cortical and inner cells hardly differentiated, walls somewhat thick, trigones indistinct. Rhizoids rather numerous below, more or less brownish. Leaves succubous, densely imbricate, subpposite, erect-patent, nearly flat or slightly decurved, obliquely inserted, line of insertion deeply sinuate, decurrent dorsally, both dorsal and ventral margins decurved, nearly round or oblong-oval, 0.7–0.9 mm long, 0.6–0.7 mm wide, apex rounded; cells 8–15μ at apex and along margin, 10–25×10–20μ at middle, walls thin, trigones large, acute, basal cells to 40×30μ; cuticle smooth. Underleaves sinuately inserted, 2–3 times wider than stem, oblong-oval, to 0.45 mm long and 0.4 mm wide, flat or slightly reflexed, margin entire, bilobed to 1/4, lobes triangular, acuminate, sinus rounded. Female inflorescence terminal; bracts oval, entire, but often emarginate at apex, 1.5 mm long, 1.2 mm wide. Perianths oblong-obovate, mouth wide, truncate-trilobed, lobes short, irregularly angular or toothed, teeth obtuse and short, triplicate, 2 lateral, 1 dorsal, wing shot, narrow and often with tooth near apex.

Specim. exam. New Zealand: Dusky Bay, *Menzies*, type in Herb. G.; Stewart Island, Port Pegasus, Pegasus Creek, on lip of waterfall at sea level, occurring with *Pachyglossa tristicha*, Aug. 1, 1949, *W. Martin 530* in Herb. NICH. Falklands Islands, *J. D. Hooker*, type of *Jungermannia subintegra* Tayl. in Herb. G.; from Herb. *Taylor*, type of *Lophocolea grisea* β in Herb. G.

Only a single shoot with a perianth was at our disposal, and bracteole and almost all of underleaves had been dissected away and lost. The present species resembles the preceding two, but its perianth is most characteristic of *Lophocolea*, having the sharp and winged keel with a tooth and the angular or shortly toothed lobes.

Stephani (1906) cited, for the localities, "Hab. New Zealand (Menzies), Falklands Isles (Hooker, Lyall), Fretum magellan. (Hooker, Spegazzini, Hariot)", and remarked, "Hierher gehören wahlscheinlich nach Mitten folgende als steril bekannte Arten: *Lopho. grisea* Taylor Syn. Hep. p. 169, *Lopho. rivalis* Taylor ibid. p. 701, *Lopho. sabuletorum* Hooker ibid. p. 697 *Jung. subintegra* Tayl. J. of Bot. 1844 p. 477, *Lejeunea subintegra* Taylor Syn. Hep. p.376, *Lopho. subviridis* Tayl. Syn. Hep. p. 699." We were able to examine the schizotype specimens of *L. grisea* and *Jungermannia subintegra*. These two species are quite similar and are considered to be of the same taxon. They lack perianths, and differ from *L. novae-zelandiae* in having narrower underleaves and nearly flat, distant and not so rigid leaves. However, this species is very plastic, and such differences should be regarded as habitat modifications, possibly growing in water or very wet sites.

Addendum. After the manuscript was prepared, we received from Dr. R. Grolle (Jena) a reprint of the paper: Th. Herzog and R. Grolle, Was ist *Pachyglossa?* (Rev. Bryol, Lichenol. **27**: 147–165. fiig. I–V. 1958), in which they described 3 species of *Pachyglossa*, and reduced *P. tristicha* Herz. to a synonym of *P. tenacifolia* (Hook.) c. n. (=*Jungermannia tenacifolia* Hook. 1847) and *Lophocolea azopardana* Steph. to that of *P. spegazziniana* (Mass.) c. n. (=*Lophocolea spegazziniana* Mass. 1885) respectively. Their paper deals with a number of little known southern species of *Lophocolea* and *Herpocladium*, including many useful comments and important criticism, and should be highly appreciated.